Remarks/Arguments

Applicants have received and carefully reviewed the Office Action of the Examiner mailed June 29, 2007. Currently, claims 1-27 remain pending. Claims 1-29 have been rejected. In this amendment, claims 1 and 8 have been amended. Favorable consideration of the following remarks is respectfully requested.

Claim Rejections – 35 USC § 102

On page 2 of the Office Action, claims 1-4, 6-12, 15, 18-22, and 24-26 were rejected under 35 U.S.C. 102(a) as being anticipated by Pouchak '302 (U.S. Patent No. 6,647,302). After careful review, Applicant must respectfully disagree.

Turning first to claim 1, which recites:

> 1. (Currently Amended) A computer implemented method of operating a boiler system having a plurality of stages which may be active or inactive at a given time, the stages having outputs, the method comprising:
>
> performing a staging sequence, at a first interval, to determine how many of the plurality of stages should be active;
>
> modulating a first stage, at a second interval shorter than the first interval, to operate at less than 100% of its output; and
>
> modulating a second stage, at a third interval shorter than the first interval, to operate at less than 100% of its output;
>
> wherein the first and second stages are modulated while both stages are active.

The Examiner asserts that Pouchak '302 teaches every element of the claimed methods, pointing to column 13, line 30 to column 14, line 47 and column 15, line 61 to column 16, line 2 for support. Applicants respectfully disagree. Independent claim 1 recites a computer implemented method involving the method steps of performing a staging sequence to determine how many of the plurality of stages should be active, modulating a first stage to operate at less than 100% of its output, and modulating a second stage to operate at less than 100% of its output, wherein the first and second stages are modulated while both stages are active. Pouchak '302 does not appear to teach such method steps.

The cited portions of Pouchak '302 do appear to disclose adding and removing stages, but do not appear to specifically teach modulating the stages while they are active. For example, Pouchak '302 states, "actively manage multiple-stage node analog control level and on/off stage decisions changes such as and adding and removing functioning stages." See column 13, lines

40-42. Pouchak '302 also states, "decisions made in sequence node 300 algorithms for control relating to analog firing rate and the addition or deletion of a stage." See column 14, lines 5-7. Pouchak '302 further states, "this option would add a boiler when the load is such that the added boiler can run at minimum capacity. For example, if boiler number 1 reaches a 60% load, then boiler number 2 could be added such that both boilers can operate at 30%." See column 15, lines 64-67. Pouchak '302 thus appears to teach adding or deleting a boiler or stage, but does not appear to specifically teach modulating first and second stages while they are both active, as is recited in independent claim 1. Applicants submit that adding and deleting boilers or stages, at a certain modulation rate (e.g. 30%), does not anticipate the method step of modulating first and second active stages while they are active.

In the Response to Arguments section on page 3 of the Office Action, the Examiner states that:

> a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Considering the broad nature of the independent claims, the above-cited passage of Pouchak and more specifically col. 15, line 61 to col. 16, line 2, completely suffices in rendering these independent claims as obvious to one of ordinary skill in the art of boiler control (emphasis added).

First, the Examiner states that the above-cited passage of Pouchak completely suffices in rendering these independent claims as obvious to one of ordinary skill in the art of boiler control. However, the rejection of claim 1 is made under 35 U.S.C. § 102(a). Clarification regarding the basis of the rejection is respectfully requested.

In addition, claim 1 is a method claim. The intended use reasoning argued by the Examiner is believed to only apply to "apparatus" type claims. For example, MPEP § 2114 has the headings "APPARATUS CLAIMS MUST BE STRUCTURALLY DISTINGUISHABLE FROM THE PRIOR ART" and "MANNER OF OPERATING THE DEVICE DOES NOT DIFFERENTIATE APPARATUS CLAIM FROM THE PRIOR ART" (emphasis added). This make sense, since it certainly cannot readily be argued that a prior art structure anticipates a method if the prior art structure is merely capable of performing a claimed method, particularly if there is no teaching of actually performing the claimed method. If this were true, a general purpose computer would anticipate virtually all computer related method inventions, since a

general purpose computer could be programmed to (i.e. is capable of) perform virtually all computer related method invention. ***If the Examiner elects to maintain this rejection, Applicants respectfully request that the Examiner provide some authority for the intended use rational advanced by the Examiner, and specifically as it relates to method claims.***

It could be that the Examiner is attempting to argue that the method recited in claim 1 would inherently be performed by Pouchak. That is, under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. However, as noted in MPEP § 2112 (IV):

> The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted).

Applicants do not believe it can readily be argued that the above-cited passages of Pouchak '302 (i.e. column 13, line 30 to column 14, line 47 and column 15, line 61 to column 16, line 2) makes clear that the first and second stages are necessarily modulated while both stages are active. As noted above, the cited passages of Pouchak '302 do appear to disclose adding and removing stages, but do not appear to specifically teach modulating the stages while they are active. Certainly, Pouchak '302 could set the modulation of the stages before they become active. As such, it is not believed that such a feature is inherently disclosed in Pouchak '302.

Despite the foregoing, and in the spirit of cooperation, and without conceding the correctness of the Examiner's rejection, claim 1 has been amended to recite, in part, performing a staging sequence at a first interval, modulating a first stage at a second interval shorter than the first interval, and modulating a second stage at a third interval shorter than the first interval. A

similar feature was and is expressed in claim 12. Applicants note that the Examiner has not specifically addressed the various intervals of claim 12 in the Office Action.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). … "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). (See MPEP § 2131). Pouchak '302 do not appear to teach or suggest performing a staging sequence at a first interval, modulating a first stage at a second interval shorter than the first interval, and modulating a second stage at a third interval shorter than the first interval, as recited in claim 1. It is also noted that the claimed interval durations are not merely a matter of design choice. For example, the present specification states:

> The next two steps shown in the pseudocode 300 of the illustrative staging method in Figure 12 set the upper and lower limits for the error value, limiting error to a range of +/-32 degrees Celsius. Again, this step may be part of the settings block 302. These limits may also be modified as desired. Next, the stage delay is decremented by one, as noted also in block 304. The stage delay is a factor used to preserve stability by limiting over-cycling due to quick staging.
>
> In the illustrative embodiment, the stage delay, while not necessary, aids with stability because it takes time for a boiler to activate and begin producing significant amounts of heat, and because it takes time for some of the various sensors in the system to sense increased heat production. Thus, if staging is not delayed by a given period of time, the effects of newly activated boilers may not be sensed before more boilers are activated, leading to overshoot. For example, given an increase in load, a system operating on one boiler may have to add a second boiler. As the second boiler starts up, it will provide negligible heat for a period of time. The temperatures and error sensed may continue in a direction indicating additional heat is needed, without it being known what effect the second boiler will have once it is fully up and running. This could lead to a third boiler being activated, causing overshoot. The use of the stage delay may aid in preventing such overshoot.

(emphasis added). (Specification, page 22, lines 3-20). As can be seen, the claimed interval durations can, for example, help preserve stability and prevent overshoot. For these and other reasons, claim 1 is believed to be clearly patentable over Pouchak '302. For similar and other reasons, claims 2-4 and 6-7, which depend from claim 1, are also believed to be clearly patentable over Pouchak '302. ***If the Examiner elects to maintain this rejection, Applicants respectfully request that the Examiner specifically point out where each and every element of***

claim 1 is disclosed in Pouchak '302, and in particular, where in Pouchak '302 the first interval and second interval are specifically disclosed.

Turning to claim 8, which recites:

> 8. (Currently Amended) A computer implemented method of providing heat capacity in response to a heat load using a boiler system having a plurality of stages that may be active or inactive at a given time, the method comprising:
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> performing a staging sequence, at a first interval, to determine which of the plurality of stages should be active or inactive, resulting in a number of determined active stages;
>
> activating the determined active stages, if any; and
>
> when the determined active stages includes two or more of the plurality of stages, modulating the active stages, at a second interval shorter than the first interval, while they are active.

Without conceding the correctness of the Examiner's rejection, claim 8 has been amended to recite, in part, performing a staging sequence at a first interval and modulating the active stages at a second interval shorter than the first interval. As discussed previously, nowhere does Pouchak '302 appear to teach or suggest these features. As such, and for similar reasons to those discussed above, as well as other reasons, claim 8 is believed to be clearly patentable over Pouchak '302. For similar and other reasons, claims 9-11, which depend from claim 8, are also believed to be clearly patentable over Pouchak '302. ***If the Examiner elects to maintain this rejection, Applicants respectfully request that the Examiner specifically point out where each and every element of claim 8 is disclosed in Pouchak '302, and in particular, where in Pouchak '302 the first interval and second interval are specifically disclosed.***

Turning now to claim 12, which recites:

> 12. (Previously Presented) A computer implemented method of operating a boiler system having a plurality of stages which may be active or inactive at a given time, the method comprising the steps of:
>
> performing, at a first interval, a staging sequence to determine how many of the stages should be active; and
>
> performing, at a second interval shorter than the first interval, a modulating sequence to modulate the active stages.

Claim 12 recites, in part, the steps of performing, at a first interval, a staging sequence to determine how many of the stages should be active; and performing, at a second interval shorter than the first interval, a modulating sequence to modulate the active stages. As discussed previously, nowhere does Pouchak '302 appear to teach or suggest these features. As such, and

for similar reasons to those discussed above, as well as other reasons, claim 12 is believed to be clearly patentable over Pouchak '302. For similar and other reasons, claim 15, which depend from claim 12, is also believed to be clearly patentable over Pouchak '302. ***If the Examiner elects to maintain this rejection, Applicants respectfully request that the Examiner specifically point out where each and every element of claim 12 is disclosed in Pouchak '302, and in particular, where in Pouchak '302 the first interval and second interval are specifically disclosed.***

Turning to claim 18, which recites:

> 18. (Previously Presented) A computer implemented method of staging and modulating a boiler system in response to a load comprising the steps of:
>
> staging and modulating the system using a first control method that is adapted for achieving increased efficiency under a first set of conditions; and
>
> staging and modulating the system using a second control method that is adapted to allow cycling of the stages under a second set of conditions.

Independent claim 18 recites a computer implemented method of staging and modulating a boiler system in response to a load comprising the steps of: staging and modulating the system using a first control method that is adapted for achieving increased efficiency under a first set of conditions; and staging and modulating the system using a second control method that is adapted to allow cycling of the stages under a second set of conditions. These steps do not appear to be disclosed in the cited passages of Pouchak '302, and the rejection does not appear to specifically address this claim in any manner. Pouchak '302 does not appear to disclose each and every element recited in claim 18, or the identical invention in as complete detail as is contained in claim 18, as is required for anticipation. For these and other reasons, claim 18 is believed to be clearly patentable over Pouchak '302. For similar and other reasons, claims 19-24, which depend from claim 18, are also believed to be clearly patentable over Pouchak '302. ***If the Examiner elects to maintain this rejection, Applicants respectfully request that the Examiner specifically point out where in Pouchak '302 each and every element recited in claim 18 can be found.***

Turning now to claim 25, which recites:

> 25. (Previously Presented) A computer implemented method of performing a staging sequence for a multi-stage boiler system in which at least one stage can be either active or inactive, the method comprising the steps of:

observing an error measured as a difference between a temperature and a setpoint;
observing a rate of change of the error; and
combining the error and the rate of change of error to determine whether:
an inactive stage should become active;
an active stage should become inactive; or
no change in the number of active stages is necessary.

Independent claim 25 recites a computer implemented method of performing a staging sequence for a multi-stage boiler system in which at least one stage can be either active or inactive, the method comprising: observing an error measured as a difference between a temperature and a setpoint; observing a rate of change of the error; and combining the error and the rate of change of error to determine whether: an inactive stage should become active; an active stage should become inactive; or no change in the number of active stages is necessary (emphasis added). Nowhere does Pouchak appear to teach or suggest these steps.

In the Office Action, the Examiner cites to column 14, lines 21-34 of Pouchak as teaching these features. The corresponding passage recites:

> Sequencing controller 200 provides a method to control dynamic loading and staging of boiler stage node functionality such as mode progression monitoring, pre-purge speed, pre-ignition speed control, Heat evaluation mode, and post purge ignition shutdown capabilities. By proper boiler system design, all mode monitoring and transitions present in the stage node can be implemented without interfering with the sequencer nodes staging requests. In addition, if any errors or faults occur in stage node 380, then sequencer node 300 can dynamically adjust the control of the remaining multiple stages individually of a high efficiency condensing, automatic bypass control, modulating firing rate boiler by taking into account the failed status and readjusting the load dynamically independent of the source control algorithm.

Nowhere does this passage appear to disclose each and every element of claim 25, or the identical invention in as complete detail as is contained in claim 25. More specifically, this passage does not appear to teach, disclose or suggest a method comprising: observing an error measured as a difference between a temperature and a setpoint; observing a rate of change of the error; and combining the error and the rate of change of error to determine whether: an inactive stage should become active; an active stage should become inactive; or no change in the number of active stages is necessary, as recited in claim 25. For these and other reasons, claim 25 is believed to be clearly patentable over Pouchak '302. For similar and other reasons, claim 26, which depends from claim 25, is also believed to be clearly patentable over Pouchak. ***If the***

Examiner elects to maintain this rejection, Applicants respectfully request that the Examiner specifically point out where in Pouchak '302 each and every element of claim 25 can be found.

On page 2 of the Office Action, claim 17 was rejected under 35 U.S.C. §102(b) as being anticipated by Shprecher et al. (U.S. Patent No. 5,042,431). After careful review, Applicant must respectfully disagree. Claim 17 recites:

> 17. (Previously Presented) A computer implemented method of controlling a multi-stage boiler system having a number of stages that can be either active or inactive, the method comprising the steps of:
> determining whether to make an inactive stage active; and
> determining whether to make an active stage inactive; wherein:
> a first delay is provided after making an inactive stage active,
> a second delay is provided after making an active stage inactive, and
> the first delay is longer than the second delay.

As can be seen, claim 17 recites the steps of: determining whether to make an inactive stage active; determining whether to make an active stage inactive; wherein: a first delay is provided after making an inactive stage active, and a second delay is provided after making an active stage inactive, wherein the first delay is longer than the second delay. Nothing in Shprecher et al. appears to teach these specific method steps.

The rejection specifically cites to column 4, line 53 to column 5, line 2 of Shprecher et al., which states:

> The controls appearing inside access panel 50 are illustrated in FIG. 2. In order to make adjustments, a slide switch 52 is moved to the "setup" position, and after all adjustments are completed, it is moved to the "normal" position. When trimmer potentiometers, A1, B1, C1, or D1 are adjusted, the ignition points of the corresponding stages are adjusted. Similarly, when trimmer potentiometers A2, B2, C2, or D2 are pressed, the start of modulation threshold point for enabling the stage after the corresponding stage is set. When pushbutton 42 is pressed repeatedly, LEDs alongside the trimmer potentiometers are lit in turn, and the setting of the corresponding trimmer potentiometer may then be read on display 40. Similarly, potentiometer E permits setting the short-cycling delay in minutes, potentiometer G allows for setback of the setpoint temperature or pressure, and potentiometer H permits adjustments of the standby time in minutes.

It appears that this passage allows the user to modify a short-cycling delay, and that the duration of a stand-by mode is adjustable. However, the stand-by mode appears to be a mode in which the boiler is indicated to be turned on, but is waiting for expiration of a delay period (e.g. on

stand-by). There would appear to be no indication that a first delay is provided after making an inactive stage active and a second delay is provided after making an active stage inactive, wherein the first delay is longer than the second delay, as recited in claim 17. As noted above, MPEP § 2131 states that in order to anticipate a claim, a reference must teach every element of the claim, and the identical invention must be shown in as complete detail as is contained in the claim. The cited passage of Shprecher et al. clearly does not disclose each and every element of claim 17, or the identical invention in as complete detail as is contained in claim 17. For these and other reasons, claim 17 is believed to be clearly patentable over Shprecher et al.

Claim Rejections - 35 USC § 103(a)

On page 2 of the Office Action, claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Pouchak '302 in view of Pouchak '678 (U.S. Patent No. 6,536,678). For at least the reasons set forth above, Pouchak '302 does not appear to teach the basic elements of independent claim 1, from which claim 5 depends. Pouchak '678 does not appear to provide what Pouchak '302 lacks. Thus, even if one were to combine these references, one would not arrive at the claimed method. Therefore, claim 5 is believed to be clearly patentable over Pouchak '302 in view of Pouchak '678.

On page 3 of the Office Action, the Examiner refers to claim 13, 14, and 23, but does not specifically reject these claims. As such, Applicant is uncertain whether the Examiner is rejecting these claims or if they are considered allowable subject matter. Applicant respectfully requests that the Examiner specifically reject these claims or indicate that they are allowable subject matter.

In addition, regarding claim 13, 14, and 23, the Examiner mentions that these claims are considered a matter of obvious design choice. Applicant must respectfully disagree with this assertion. As discussed previously with reference to claim 1, the recited delays or intervals can, for example, help preserve stability and/or overshoot. As such, such elements are not merely a matter of design choice. For these and other reasons, claims 13, 14, and 23 are all believed to be clearly patentable over Pouchak '302.

Claims 16 and 27

Claims 16 and 27 were not specifically addressed or rejected in the substantive portion of the Office Action. It is believed that claims 16 and 27 are in condition for allowance.

Conclusion

Reconsideration and reexamination are respectfully requested. It is believed that all pending claims 1-27 are in condition for allowance. Issuance of a Notice of Allowance in due course is respectfully requested. If a telephone conference would be of assistance, please contact the undersigned attorney at 612-359-9348.

Respectfully submitted,

Dated: December 28, 2007

Brian N. Tufte, Reg. No. 38,638
CROMPTON, SEAGER & TUFTE, LLC
1221 Nicollet Avenue, Suite 800
Minneapolis, MN 55403-2402
Telephone: (612) 359-9348
Facsimile: (612) 359-9349